

TECHNOLOGY NEEDS/OPPORTUNITIES STATEMENT CONTAMINANT BINDING SCIENCE NEED

Identification No.: RL-DD026-S

Date: November, 2001

Program: Environmental Restoration

OPS Office/Site: Richland Operations Office/Hanford Site

PBS No.: RL-CP01

Waste Stream: LLW Debris (ER-05, risk = 4), MLLW lead (ER-02, risk = 4), and TRU debris (T3-ER, risk = 5)

TSD Title: N/A

Operable Unit (if applicable): N/A

Waste Management Unit (if applicable): N/A

Facility: Hanford facilities undergoing final decontamination and decommissioning

Priority Rating:

This entry addresses the "Accelerated Cleanup: Paths to Closure (ACPC)" Priority: Select a "1", "2" or "3" to assess the impact of the need/opportunity relative to the current site baseline.

- ☐ 1. Critical to the success of the ACPC
- ☒ 2. Provides substantial benefit to ACPC projects (e.g., moderate to high lifecycle cost savings or risk reduction, increased likelihood of compliance, increased assurance to avoid schedule delays)
- ☐ 3. Provides opportunities for significant, but lower cost savings or risk reduction, and may reduce uncertainty in ACPC project success.

Need Title: Contaminant binding science

Need/Opportunity Category: Science Need

Need Description:

Long-life, cost-effective, remotely applicable fixatives and decontaminants are needed for a variety of contaminants (Cs, Sr, Pu, U, Pb, and other RCRA metals) and surfaces (e.g., coated and uncoated concrete, cement covered with asphalt, coated and uncoated carbon steel and stainless steel glove boxes and ductwork). The products must be easy to apply and remove. Fixatives and decontaminants are needed for underwater application as well as for dry application.

An understanding is needed of contamination chemistry and their binding mechanism to contaminated surfaces, decontaminants and fixatives to allow for optimal methods to be developed.

Schedule Requirements:

Earliest Date Required: 10/1/2001

Latest Date Required: 9/30/2046

Problem Description:

Loose, dispersible and fixed surface contamination (e.g., Cs, Sr, Pu, U, Pb and other RCRA metals) is present in high and low radiation areas on various surfaces (e.g., coated and uncoated concrete, coated and uncoated carbon steel, glass, plastics, rubber and stainless steel). The dispersible contamination presents an immediate worker exposure concern and a long-term environmental concern. Current fixative techniques are paint, tar, polymeric barrier systems, rustoleum or no fixative. Some of the current fixative techniques are ineffective (no fixative and rustoleum), allow leaching of radioactive material, allow for build up of hydrogen and/or helium over time, or are relatively high in cost to apply and remove.

Decontamination methods are needed that minimize worker exposures, waste generation, costs and risks and do not create mixed waste. Current methods for decontamination are costly and time consuming, and many of them create secondary waste. Baseline decontamination technologies are: scabbling and hydro-lancing for concrete; wipes, hydro lancing, ice blasting, steam, acid washes, and electropolishing for metals; and wipes and strippable coatings/gels for glove boxes.

Potential Life-Cycle Cost Savings of Need (in \$000s) and Cost Savings Explanation: Rough order of magnitude (ROM) life cycle cost (LCC) savings of \$10M for the DOE Complex including \$2M for the Hanford Site. LCC savings estimate is based on the assumption that metal decontamination could result in double the savings realized by lead decontamination. Potential areas of cost savings include: (1) the cost of disposal is avoided, and (2) the cost of obtaining an asset is reduced (e.g., the cost to make a drum from recycled material is less costly than to buy a new drum).

Benefit to the Project Baseline of Filling Need:

Contamination would be contained where current fixatives are ineffective and worker safety and maintenance and decontamination costs and waste volumes would be reduced with improved fixatives and decontaminants.

This Science Need also supports the following Hanford Technology Needs: RL-DD021, RL-DD032, RL-DD059, RL-DD062, RL-DD063

✕ Cost Savings ✕ Risk Reduction ✕ Enabling Knowledge

Relevant PBS Milestone: PBS-MC-030 and PBS-MC-031

End-User: Environmental Restoration Project

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